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NOTES ON THE NORTH AMERICAN SPECIES OF AGROPERINA HAMPSON.

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(PLATES IV AND V.)

Agroperina is described in the Catalogue of the Lepidoptera Phalaenæ in the British Museum, Vol. VII, 398, 1908, as follows: "Proboscis fully developed; palpi upturned, the second joint reaching about to the middle of frons and fringed with hair in front, the third short, porrect; frons smooth; eyes large, rounded; antennæ of male ciliated; head and thorax clothed with hair and hair-like scales, the latter with indistinctly double ridge-like dorsal crest; tibiæ moderately fringed with hair; abdomen with dorsal crests on basal segments, some rough hair at base and lateral fringes of hair. Fore wing rather narrow, the apex rectangular, the termen obliquely curved and slightly crenulate; veins 3 and 5 from near angle of cell; 6 from upper angle; 9 and 10 anastomosing with 8 to form the areole; 11 from cell. Hind wing with vein 3, 4 from angle of cell; 5 obsolescent from just below middle of disco-cellulars; 6, 7 from upper angle; 8 anastomosing with the cell near base only."

The generic type is given as *A. lateritia* Hufn., a common species of wide distribution in Europe, Asia and North America. Most of the other species referred here are strictly North American and they include species heretofore referred to *Hadena* (*Xylophasia*) and

Orthosia. These species are *dubitans* (*sputatrix*), *cogitata*, *lateritia*, *illustra*, *conradi*, *lutosa*, *helva*, *inficita* and *morna*. Of these *illustra* was unknown to Hampson in nature, and its association with the others in the genus is not warranted. *Hadena morna* Streck., of which *hulstii* Grt., is correctly made a synonym, is incorrectly identified—perhaps on my authority—and that belongs to *Sidemia* Staud., as used by Hampson, and very much resembles the *Hadena subornata* Staud., from Mongolia, as figured on Hampson's Plate CXVIII, f. 31.

The remaining species comprise the three former hadenids, *lateritia*, *dubitans* and *cogitata*, separated by Hampson from the others because of the white lunule on the outer edge of the reniform, and the orthosiid species *conradi*, *lutosa*, *helva* and *inficita* in which the reniform has no white. The two series have very little in common, really, and none of the orthosiid series would run down to the genus *Agroperina* in the synoptic table of genera, although the hadenid species would. Nevertheless, for convenience, and because the orthosiid species are really homeless elsewhere, they may be conveniently considered here.

A. lateritia has more pointed and more trigonate wings than either *cogitata* or *dubitans*, and the generic characters apply perfectly. The thoracic vestiture is composed chiefly of flattened hair which tends to become somewhat broader at tip and in well-preserved specimens the basal tufting on dorsum is also evident. In the male antennæ the joints are scarcely marked and the ciliation is hardly grouped as a tufting, although most obvious at the middle of each joint. In the series before me extending clear across the continent north of New York, down the Sierra Nevada Mountains into California and down the Rocky Mountains into Colorado, there is no confusing variation. The purplish red-brown color varies little—sometimes a little more rusty, sometimes a little more smoky; but always very uniform and without contrasting maculation. The white-edged reniform is the most obvious bit of ornamentation, the t.p. line may have a series of whitish venular points, and the s.t. line may be traceable by a paler shading; but for the rest it may be set down as merely traceable. Dates of flight range from June into August.

The male genitalia have the characteristic ladle-shaped tip of the large hadenids, fringed with spinules and with a spinulose area at the lower margin: the clasper is small and rather slender, tapering rather

evenly to the tip. The uncus is dilated before the tip and that feature is characteristic in the series. The chitinous penis-sheath has two saw-tooth processes near the tip and is quite characteristic in form. No other species referred here agrees closely with this form which is also the largest of the series.

Hampson makes *satina* Strck., a synonym of this species, and that agrees with my own note which refers to the type as an undersized, rubbed *lateritia*. Strecker's specimen is from Anticosta, and I have from Grand Lake, Newfoundland, two male examples which are, I believe, referable to Strecker's species. The male genitalia differ only in minor details and *satina* is probably no more than an undersized variation.

Cogitata Smith is similar in color, a little more purplish as a rule; but the primaries are decidedly shorter, broader and the apex less produced. The vestiture of the thorax is rather more scale-like and the tuftings are better marked, especially the posterior dorsal tuft, while the dorsal tuftings of the abdomen tend to become complete. There is little more maculation than before, but there is a tendency to completely outline the reniform in white, and there is a central white mark or lunule which often fuses with the other mark, leaving a white blotch with or without a central brown line. The median lines may be altogether lost, indicated by pale powderings, or by venular dots only. There is nearly always a fairly obvious pale s.t. line and usually also a pale line at the base of the fringes.

The male antennæ are very similar to those of *lateritia*. The genitalia of the male offer several characteristic differences. The uncus is very slender and not dilated before the tip; the ladle-shaped tip of *harpes* is much smaller and the patch of spinules at the angle is very much reduced. The clasper, on the other hand, is much stouter and very decidedly longer. The penis-sheath is of quite different form and, instead of two saw-teeth, there is a single small spinule. Two dissimilar examples from Kaslo, B. C., and Sierra Nevada, California, showed absolutely no material differences in structure. The distribution of this species is very similar to that of *lateritia* and the dates of flight are also about the same.

Of this species also I have specimens, two males and four females, from Grand Lake, Newfoundland, in August, and they also are undersized and somewhat thinly scaled, bearing the same relation to normal

cogitata that *satina* does to *lateritia*. The male genitalia are figured and show only such differences as are due to smaller size and method of mounting.

Dubitans Wlk., = *sputatrix* Grote, is very close to the preceding, but is suffused with black-brown, and in most cases has the normal noctuid maculation easily traceable, though never prominent. The marking of the reniform is as in *cogitata*, while the orbicular and claviform are also defined and readily traceable. At first blush there might seem some difficulty in differentiating between *cogitata* and *dubitans*, for some of the latter show decidedly brown at times, while some of the former tend to blackish; but keeping this tendency to a complete maculation in mind the difficulties vanish. The vestiture now becomes even more scale-like and the thoracic tufting even more distinct. In good examples there is an anterior divided crest and a well defined posterior crest, while the dorsal abdominal tuftings are complete.

The structure of the male antenna does not differ from that of *cogitata*; but the male genitalia are in some respects nearer to those of *lateritia*. The ladle-like tip is large, the fringe of spines is well marked and the patch at the inner angle is large. The clasper is as slender as in *lateritia*, but much longer, while the uncus has no trace of dilation and is even more attenuated than in *cogitata*. The penis-sheath has two spines instead of one and is characteristic in form.

This species is much more limited in distribution than either of the preceding and does not extend across the continent. Its home is in the Middle and New England States, but it ranges into Canada, westward to South Dakota, and southward to Virginia. Dates of flight are in July and August.

One other character common to all the previously described forms should be mentioned. In each case the males have a long-stalked hair pencil at the base of the abdomen, and there is a characteristic groove extending between dorsal and ventral surface of two segments into a pocket extending through the third, and into the fourth from base. Of the orthosiid series *helva* alone has this pencil and pocket. All the others lack both pencil and pocket entirely, and have no other secondary male characters to replace them.

Of this orthosiid series, *helva* is the best known and quite distinct from all others. It has shorter and broader wings and all the normal

maculation of primaries is complete. The ground color is fulvous yellow tinged with reddish, and the maculation is purplish brown to blackish. The basal and median lines are geminate, the median shade is conspicuous, and the s.t. line is defined by a preceding purplish shade. The ordinary spots are completely outlined and the reniform inferiorly is dark-filled. Altogether an unmistakable form, in which there is little variation except that due to a fading of the darker lines.

The vestiture is narrowly flattened hair, forming on thorax a small longitudinal crest divided anteriorly and posteriorly. The dorsal tufting of the abdomen does not extend beyond the middle in any case. The male antennæ are ciliate, but there is also a single long bristle on each side of each joint.

The genitalia of the male are of the usual type: the tip of the harpe is much broader than in any other species, with a rather large patch of small stout spinules at inner angle; clasper rather long and moderately slender. The uncus is very slender, but slightly dilated before the pointed tip. Sheath of penis almost evenly cylindric, with two little denticles near the tip.

This species occurs in August and September from Canada to Virginia, and west to the Rocky Mountains. I have not seen any specimens from the western slope.

Lutosa Andrews is a pale yellowish gray species more or less powdered with reddish and sometimes, especially in the female, very decidedly rufous even in ground. The wings are much narrower than in *helva* and obtuse at tip. The normal maculation is all present but never conspicuous, and the most obvious feature is the dusky filling of the inferior portion of the reniform. Very rarely the entire reniform is dusky and gives the specimen a somewhat unusual appearance.

The thoracic vestiture is mostly flattened hair, the intermingled scales being in many cases short, broad, spatulate forms, set upon a very long hair-like stalk. The dorsal tufting is very obscure, forming a low, keel-like ridge slightly divided in front and scarcely marked behind. In the average example in collections, this tufting is practically indistinguishable. The abdominal tufting is at base only, and never conspicuous, even there, while of most females, even in good condition, it might be said that they are untufted. In the males the lateral tuftings are generally distinct.

The antennæ of the male are simple, ciliate, with single lateral bristles that are not much more prominent than the other hairs.

The genitalia of the male are of the same general type as the preceding and very close to those of all the following species. The ladle-like tip is moderate or rather small in size, but really more spoon-shaped, with a coronal fringe of spinules; but without the patch of spinules at the inner or anal angle which is found in all the preceding forms. The clasper starts differently and forms a shoulder or angle at the base. The uncus agrees with that of *helva* in a general way, and in all the following species there is a slight dilation beyond which the tip is rather long drawn out. There is some difference between the penis-sheaths in the species; but these have not been well enough compared to determine how much is due to difference in position or point of view.

As for the rest of the species they have been hopelessly confused in collections under the names *conradi*, *citima*, *morna*, *exornata*, *belangeri* and *inficita*, where they have been named at all, and I long ago abandoned any idea that I knew the species until Sir George F. Hampson was able to compare specimens critically. He was good enough to look over a series of specimens that I sent him and from these, supplemented by my own accumulations and by a splendid series from Dr. Barnes, I have been able to reach what I think is a correct conclusion.

Concerning *Orthosia belangeri* Morr. there never was much doubt, and Hampson refers this positively as equal to *Graphiphora inficita* Wlk. Of a specimen that I sent him for comparison, he said that it was absolutely identical with Walker's type.

Under *Orthosia conradi* Grote, specimens showing a considerable range of variation appear in collections; but the name *citima* Grote appears rarely. Hampson refers *citima* as a synonym of *conradi* and in this he seems to be right. The type of *citima* is in the Neumoegen collection, and I sent a carefully compared specimen to Hampson, who returned it "almost exactly like type of *conradi* and exactly like *citima* of Schaus collection, compared with type."

More or less mixed with the above, is a species that I have called *exornata* Moeschl., and have distributed under that name. Of this Hampson said that it did not agree with that species in the B. M. collection, but seemed to him a variety of *inficita* Wlk. I have now

the true *crornata*, and Hampson was right in pointing out my error; but the form is not *inficita* Wlk.; it grades insensibly into the form which is described and figured by Hampson as *morna*. Dr. Barnes has a magnificent series of examples from the Yellowstone, Colorado, and various British American points and two series of these can be separated. I have called one of these species *indcla*, and the other *lincosa*.

An off-shoot from the above, but I think distinct, is what I believe Hampson refers to as "Ab. 2," of *A. morna*. "Head, thorax and fore wing deep rufous; abdomen and hind wing more tinged with rufous." I have called this *pendina*, and believe all the forms now in collections, belonging to this series, can be placed under one or the other of the above names.

Agroperina inficita Wlk. = *belangeri* Morr. is the darkest and best marked species of the series. The primaries are dark luteous brown and the secondaries dark smoky, almost blackish. The maculation of the primaries is complete, the median lines single and the median shade well-defined, rusty brown, strongly angulated on the reniform. The s.t. line is of the ground color, relieved against the darker terminal space and preceded by a darker shade in the s.t. space. The ordinary spots are present, the orbicular feebly marked, the reniform always dusky inferiorly, sometimes all dark and usually more or less definitely outlined by paler scales.

The antennæ of the male have the joints slightly marked, ciliate, the cilia somewhat grouped into tufts, without longer lateral bristles. There are no obvious dorsal tuftings on the abdomen and the vestiture consists of flattened hair without obvious scaly admixture. The flattening of the hair is mostly at the tip, giving the individual hair somewhat the appearance of a miniature long-handled shovel.

There is very little variation in this species so far as my material extends; the coloring is very uniform and the relative relief of the spots and lines shows only a slight difference. All the material seen by me comes from Quebec or Newfoundland, and all the dates are in August.

The genitalia of the male do not differ in any very important feature from those of *lutosa*. The harpes are somewhat less angulated, and the constriction before the dilated tip is less marked. The other differences can be more easily appreciated by comparing the figures than from descriptions.

Agroperina conradi Grt. = *citimq*^{*} Grt. is distinguished by Hampson from its allies by having the s.t. space paler than the rest of the wing, and that is the general impression given when examining a series; but if the individuals are closely examined it will be found that many of them do not fit. There is, however, in addition to this, a general rough, powdery appearance which carries the species in a series even when the color is almost uniform. Very often the terminal space is darker than the rest of the wing, and that also helps out in the recognition of the species. All the normal noctuid maculation is present; but none of it is contrasting. In well-marked examples the median lines are geminate and the median shade is easily traceable but this median shade is never defined as in *inficita*, and tends to disappear altogether. The s.t. line is always traceable and nearly always well-defined. Usually the terminal space is as dark as, or darker than the rest of the wing, and generally there is also a dusky shade preceding the s.t. line. A claviform is traceable in well-marked examples; but usually it is altogether absent. The orbicular is always traceable and varies somewhat in form; but is never large nor conspicuous. The reniform is rather large, centrally constricted, and tends to become dusky inferiorly; its outer margin is often paler and sometimes the entire mark is paler than the median area. The ground color varies from a sordid luteous brown to a very decided reddish.

The thoracic vestiture is hairy, only a little flattened, forming no distinct crestings and only a loose tuft posteriorly. The abdomen is untufted except for a loose dorsal tuft at base. The antennæ of the male have the joints marked, the ciliæ laterally grouped, without longer bristles—altogether a little more marked than *inficita*.

The genitalia of the male do not differ much from those of *inficita*, but are figured for comparison. Altogether, although this is a variable species in details, its general habitus is remarkably constant.

I have before me 10 males and 16 females from various points in Colorado, from Calgary, Alberta, and Winnipeg, Manitoba, and Hampson cites also "Arizona." All dates are in July.

***Agroperina indela*, new species.**

Ground color reddish luteous, very even, tending to an overlay of reddish. Primaries with all the normal maculation traceable in the best-marked specimens; but tending to become entirely lost, some examples being immaculate except for the dusky inferior portion of reniform. Median lines single, in

course like those of *conradi*. S.t. line at best only traceable when the terminal space is a little darker and there is a darker shading in the s.t. space. Claviform barely indicated in some females; usually quite lost. Orbicular lost or faintly pale ringed, varying in shape. No median shade. Reniform moderate in size, constricted, a little dusky inferiorly, tending to become lost, in rare cases completely pale ringed. Secondaries dull smoky yellowish, paler at base.

Expands, 35-43 mm. = 1.40-1.70 inches.

Habitat.—Yellowstone Park, Wyoming, in July; Sheridan, Idaho; Glenwood Springs, Gunnison and Garfield Co., Colorado, July, August, September; Bozeman, Montana, in July; Pullman, Washington, June 24.

A series of 41 males and 16 females—most of them from Dr. Barnes's collection.

The species is *conradi* with all the powdering gone and most of the maculation washed out. It is probably the form figured as *morna* by Hampson and, while it varies greatly, it retains a characteristic appearance. There is no chance of confusing it at any time with *conradi*; but it may conflict at times with the following, *lineosa*.

The vestiture consists of hair and flattened hair and forms no thoracic crests. In good males the loose vestiture gives the appearance of dorsal tufts. The male antennæ have the joints marked and tufted as in *conradi*, but appear a little thicker.

The genitalia are also essentially like those of *conradi*.

Agroperina lineosa, new species.

Reddish luteous with a slightly smoky tinge, sometimes with a trace of purplish. All the normal maculation neatly but not contrastingly written. Median lines simple, fine, the t.p. crenulate. Median shade usually obvious, traceable in all specimens. S.t. line distinct, paler than the adjacent shades. Claviform traceable in a few cases only, lost in most instances. Orbicular usually lost, sometimes outlined by brown scales. Reniform of the usual constricted form, rather conspicuously dusky inferiorly—this feature with the angulated median shade forming the most conspicuous feature of the species. Secondaries yellowish, smoky, darkening outwardly, with a well-defined median shade line and usually a discal lunule.

Expands, 35-41 mm. = 1.40-1.65 inches.

Habitat.—Calgary, Alberta, in July; Brandon, Cartwright, Aweme, Miniota and Winnipeg, Manitoba, all in July.

A series of 25 males and 5 females; with an additional male and 2 females from Olds, British Columbia, so poor that determination is uncertain; but which probably belong here.

The vestiture is hairy with only a slight admixture of flattened hair, forms no obvious crest, but does form a well-defined basal tuft. Abdomen with only a loose dorsal tufting at base. Antennæ of male like those of *indela*.

The genitalia of the male are similar to those of *indela* and *conradi*, but have the clasper distinctly longer and the margin of the harpes different in outline. Two figures of this form, taken from specimens differing in appearance and from different localities, agree with each other and differ equally from the figure of *indela*.

It is very easy to mix this form with *indela* and I was strongly inclined to consider them as identical until I noted the genitalic differences, slight as these are. But, once a series is separated out, the neat transverse lines, the well-defined median shade and rather conspicuous dark marking of the reniform emphasize the species. Withal the two are very close and, in the females especially, it will be easy to confuse them. The males are much more readily discriminated.

***Agroperina pendina*, new species.**

Ground color rather deep luteous red-brown. Primaries darkening a little outwardly, so that the concolorous s.t. line is slightly relieved. Median lines lost or only traceable; t.a. line usually all gone; t.p. line more usually traceable and sometimes accompanied by a slightly paler shading. Claviform lost in all the specimens before me. Orbicular usually traceable, often lost entirely, never well-defined. Reniform of the usual constricted type, laterally often with pale defining lines and inferiorly dark filled. There is only the vaguest trace of a median shade in any specimen. Secondaries distinctly yellowish, with a rather definite, broad, smoky outer border, a narrow median dusky line, and a more or less obvious discal lunule.

Expands, 35-43 mm. = 1.40-1.70 inches.

Habitat.—Calgary, Alberta, in July; Winnipeg, Brandon, Miniota, Manitoba, June and July; Olds, British Columbia, August.

Differs from all the other species in the uniform deep reddish shade of head, thorax and primaries, on which latter the usual maculation is almost obsolete. The yellow color of secondaries with the unusually definite outer border is also quite characteristic and tends to differentiate the species. It is really nearer to *indela* than to *lincosa* in character of primaries, though it resembles the latter more nearly in the secondaries. A series of 13 males and 6 females is before me for comparison.

The vestiture is mostly hairy with some flattened hair intermixed,

forming only a fairly obvious basal tuft on thorax and loose basal tufts on abdomen in the male. In the female there is no distinct dorsal tufting on the abdomen.

The antennæ of the male have the joints marked and the ciliations arranged toward the centre, but not in definite tufts. In this connection it may be said that the antennal differences noticeable between allied species are often more apparent than real. In examining a long series of specimens otherwise closely resembling each other and from the same locality, it becomes apparent that the ciliations quickly become broken and thinned out. A perfectly fresh, new example will have the ciliations longer than the width of the segments and quite apparently grouped in a loose central tuft, so that the member appears "bristle tufted." A flown specimen, obviously the same, will have the fringes broken, part of them lost and so thinned out that they lose the tufted appearance and so seem more evenly arranged as well as more scanty and shorter. The actual form of the antennal segment, however, forms a good discriminating character in many instances.

The male genitalia of *pendina* are nearer to those of *indela* than to those of *lincosa*. The form of the clasper is very similar, and so is the general form of the harpes. But the ladle-like expansion is decidedly broader, and the shape of the penis-sheath is materially different. Comparison of the figures given will demonstrate these differences which are more easily seen than described.

Arranged in tabular form the species may be separated as follows, using Hampson's general grouping and characters.

SYNOPTIC TABLE OF AGROPERINA.

- | | |
|---|------------------|
| 1. Primaries with a small white lunule on outer edge of reniform..... | 2 |
| Primaries without such a lunule..... | 4 |
| 2. Primaries with a white lunule in center of reniform..... | 3 |
| Primaries without such a lunule..... | <i>lateritia</i> |
| 3. Primaries purplish red-brown..... | <i>cogitata</i> |
| Primaries purplish red-brown, suffused with black-brown..... | <i>dubitans</i> |
| 4. Primaries fulvous yellow tinged with rufous; maculation purplish or blackish, conspicuous, broken, giving the wing a mottled appearance..... | <i>helva</i> |
| Primaries even in color, markings continuous, not contrasting or conspicuous | 5 |
| 5. Primaries grayish white, irrorated with rufous..... | <i>lutosa</i> |
| Primaries luteous to fulvous yellow and red brown..... | 6 |

6. Primaries irrorated with brown, s.t. space paler than the rest of the wing *conradi*
 Primaries not irrorated, s.t. space concolorous.....7
7. Primaries deep brown, with conspicuous median shade; secondaries blackish *inficita*
 Primaries lighter in color, without conspicuous median shade, secondaries pale to smoky yellowish.....8
8. All the transverse maculation neatly marked though not conspicuous. *lineosa*
 Transverse maculation wholly or in great part lost.....9
9. Pale yellowish to pale reddish luteous; secondaries whitish to smoky, without definite outer border..... *indela*
 Deep luteous red-brown; secondaries yellow to smoky, with a definite outer dark border..... *pendina*

EXPLANATION OF PLATES IV AND V.

Male Genitalia of the Species of Agroperina.

- 1. *A. lateritia* Hfn. Colorado specimen.
- 2. *A. satina* Strck. Newfoundland specimen.
- 3. *A. cogitata* Sm. Colorado specimen.
- 4. *A. cogitata* Sm. Sierra Nevada specimen.
- 5. *A. cogitata* Sm. Newfoundland specimen.
- 6. *A. dubitans* Wlk. New Jersey specimen.
- 7. *A. dubitans* Wlk. So. Dakota specimen.
- 8. *A. helva* Grt. So. Dakota specimen.
- 9. *A. lutosa* Andrews. New Jersey specimen.
- 10. *A. inficita* Wlk. Quebec specimen.
- 11. *A. conradi* Grt. Colorado specimen.
- 12. *A. conradi* Grt. Calgary specimen.
- 13. *A. indela* Sm. Montana specimen.
- 14. *A. lineosa* Sm. Calgary, Alta., specimen.
- 15. *A. lineosa* Sm. Brandon, Man., specimen.
- 16. *A. pendina* Sm. Calgary specimen.